









19—NATURAL RESOURCES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
19.1—Veins and mineralized areas; metamorphic facies boundary; mineral resource areas				
19.1.1	Vein—Certain		lineweight .30 mm color 100% red dot diameter 1.0 mm; spacing 5.0 mm	May also be shown in black or other colors.
19.1.2	Vein—Approximately located			
19.1.3	Vein—Approximately located, queried			
19.1.4	Vein—Concealed			
19.1.5	Vein—Concealed, queried			
19.1.6	Vein—Showing type of mineral occurrence			Place symbols where observation was made. Dip value indicates a measured dip direction and magnitude.
19.1.7	Vein—Showing dip where known			
19.1.8	Mineralized stringers, veinlets			May also be shown in black or other colors.
19.1.9	Minor inclined vein—Showing strike and dip			May also be shown in black or other colors.
19.1.10	Minor vertical or near-vertical vein—Showing strike			
19.1.11	Zone of mineralized or altered rock, type 1			Add labels to show specific types of alteration. May be used alone or may overprint other mapped units. May also be shown in black or other colors.
19.1.12	Zone of mineralized or altered rock, type 2—High level of mineralization			
19.1.13	Zone of mineralized or altered rock, type 2—Low level of mineralization			
19.1.14	Metamorphic facies boundary—Showing approximate boundary between diagnostic mineral assemblages			May also be shown in black or other colors.
19.1.15	Area of identified resources			Usually reserved for use on special-purpose maps, not on general-purpose geologic maps. Generally shown in red, but may also be shown in black or other colors.
19.1.16	Area of high mineral resource potential			
19.1.17	Area of moderate mineral resource potential			
19.1.18	Area of low mineral resource potential			
19.1.19	Area considered to have mineral resource potential but not evaluated, mostly because of inadequate data			

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
19.2—Areas of extensively disturbed ground and workings as mapped units				
19.2.1	Graded area—Extensive amount of mapped geologic unit has been removed		lineweight .175 mm line color 100% red pattern 226-R (at 45°)	Patterns should overlay other mapped units. Generally shown in black or red, but may also be shown in other colors.
19.2.2	Strip mine		hachured line and ticks: lineweights .3 mm; height .875 mm; spacing 1.75 mm lineweight .15 mm pattern 226-K (at 45°)	
19.2.3	Artificial fill—Earth materials		lineweight .15 mm H-8 20% black	Show as separately mapped units. Generally shown in black or red, but may also be shown in other colors.
19.2.4	Artificial fill—Human-generated refuse (landfill)		lineweight .15 mm H-8 pattern 226-R (at 45°)	
19.2.5	Open pit mine or quarry (surface view)		all lineweights .15 mm hachure height .55 mm; spacing 1.5 mm	Symbols should overlay other mapped units. Generally shown in black or red, but may also be shown in other colors.
19.2.6	Subsurface workings (projected to surface)		lineweight .175 mm; dash 1.5 mm; spacing .5 mm line color 100% red spacing may vary	
19.2.7	Tailings, including tailings pond (surface view)		lineweight .125 mm draft as shown	Show as separately mapped units. Generally shown in black, but may also be shown in red or other colors.
19.2.8	Mine dump (surface view)		lineweight .125 mm dash length and spacing may vary	

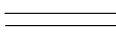
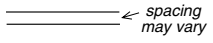
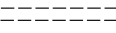
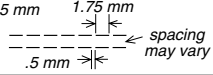
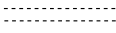
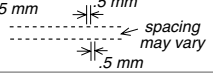

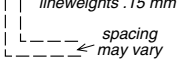



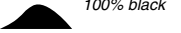

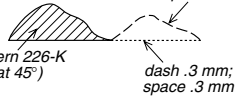

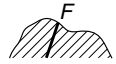
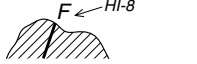
19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
19.3—Mining and mineral-exploration symbology				
19.3.1	Drill hole for mineral exploration	○	lineweight .15 mm diameter 1.375 mm	
19.3.2	Inclined tunnel or adit	┐	3.5 mm all lineweights .15 mm 45° 1.5 mm	Rotate symbol so that long line indicates azimuth of adit; place intersection of long line and two shorter ones at map position of adit.
19.3.3	Inclined tunnel or adit, inaccessible	┐+	1.25 mm all lineweights .15 mm	
19.3.4	Portal		radius .55 mm all lineweights .15 mm 3.125 mm 2.25 mm	Rotate symbol so that long lines indicate azimuth of portal; place curved ends of long lines at map position of portal.
19.3.5	Portal and open cut		all lineweights .15 mm tick length .425 mm; spacing 1.0 mm radius .55 mm	
19.3.6	Vertical mine shaft	■	lineweight .15 mm 2.0 mm	
19.3.7	Multiple vertical mine shafts	■■■	■■■	
19.3.8	Vertical mine shaft—Abandoned or inaccessible	■A	■A ← H-7	
19.3.9	Inclined mine shaft	■	all lineweights .15 mm 1.0 mm	Orientation indicates location of entry at surface.
19.3.10	Inclined mine shaft—Abandoned or inaccessible	■A	■A ← H-7	
19.3.11	Prospect (pit or small open cut)	X	lineweight .2 mm 1.75 mm 60°	
19.3.12	Sand, gravel, clay, or placer pit	✕	3.125 mm all lineweights .15 mm 60° .7 mm	
19.3.13	Sand, gravel, clay, or placer pit—Abandoned	✕	1.5 mm all lineweights .15 mm	
19.3.14	Open pit, quarry, or glory hole	⌵	hammerhead thickness .3 mm; radius 1.625 mm pick thickness .25 mm; radius 1.625 mm handle lineweights .15 mm 1.5 mm 1.5 mm 3.125 mm	
19.3.15	Open pit, quarry, or glory hole—Abandoned	⌵	lineweight .15 mm 1.5 mm	
19.3.16	Trench (surface view)—Generalized trace	—	1.5 mm lineweight .25 mm 90°	For generalized trace, bar follows direction of trench; length of bar may vary.
19.3.17	Trench (surface view)—Drawn to scale	—	all lineweights .2 mm hachure height 1.0 mm; spacing 3.0 mm	



















19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
19.4—Mines and underground workings				
19.4.1	Mine shaft—Above and below level		all lineweights .15 mm 	
19.4.2	Inclined mine shaft—Above and below level		all lineweights .15 mm 	
19.4.3	Bottom of mine shaft		all lineweights .15 mm 	
19.4.4	Winze or head of raise		all lineweights .15 mm 	
19.4.5	Raise or foot of winze		all lineweights .15 mm 	
19.4.6	Raise or winze extending through level		all lineweights .15 mm 	
19.4.7	Ore chute		all lineweights .15 mm 	Orientation indicates azimuth of feature.
19.4.8	Inclined workings—Above and below level. Chevrons point down incline		lineweight .15 mm 2.0 mm 	
19.4.9	Elevation of roof or back		lineweights .15 mm 1.0 mm 	
19.4.10	Elevation of floor or sill		HI-6 1.0 mm 	
19.4.11	Lagging or cribbing along drift		all lineweights .15 mm .55 mm 	
19.4.12	Caved or otherwise inaccessible workings— Below ground		all lineweights .15 mm 	
19.4.13	Caved or otherwise inaccessible workings— Above ground		dash 1.5 mm; space .5 mm 	
19.4.14	Diamond drill hole		circle diameter 1.25 mm 	
19.4.15	Diamond drill hole—Showing angle of inclination. Negative angles show downward slope			
19.4.16	Crosscut tunnel		radius 1.25 mm 	

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
19.4—Mines and underground workings (continued)				
19.4.17	Mine tunnel and workings (section view)—High certainty		lineweights .15 mm 	Orientation indicates azimuth of tunnel.
19.4.18	Mine tunnel and workings (section view)—Medium certainty		lineweights .15 mm 1.75 mm  .5 mm	
19.4.19	Mine tunnel and workings (section view)—Low certainty		lineweights .15 mm 5 mm  .5 mm	
19.4.20	Shaft and tunnel—Near line of section (projected to section)		dash 1.75 mm; space .5 mm  lineweights .15 mm	
19.4.21	Mine dump (section view)		pattern 226-K (at 45°)  lineweights .15 mm	
19.4.22	Rubble (section view)		 100% black	
19.4.23	Stoped area (section view)—Certain		all lineweights .15 mm dash 1.5 mm; space .5 mm  pattern 226-K (at 45°) dash .3 mm; space .3 mm	Different patterns may be used to indicate type of rock or ore removed.
19.4.24	Stoped area (section view)—Inferred			
19.4.25	Backfilled stope (section view)		 F HI-8	

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
19.5—Oil and gas fields; wells drilled for hydrocarbon exploration or exploitation				
19.5.1	Oil field—Extent defined		line color 100% green fill color 50% green line weight .2 mm	Patterned areas (extent defined) should be shown as separately mapped units. Outlined areas (extent not yet defined) should overlay other mapped units. Generally shown in red and (or) green, but may also be shown in other colors or patterns.
19.5.2	Oil field—Extent not yet defined		dash .5 mm; space .5 mm line color 50% green line weight .2 mm	
19.5.3	Gas field—Extent defined		line color 100% red fill color 50% red line weight .2 mm	
19.5.4	Gas field—Extent not yet defined		line color 100% red dash 2.0 mm; space .5 mm line weight .2 mm	
19.5.5	Oil and gas field—Extent defined		pattern 426 (at 45°) line weight .2 mm	
19.5.6	Oil and gas field—Extent not yet defined		long dash 2.0 mm; short dash .5 mm; space .5 mm line weight .2 mm	
19.5.7	Drilling well (hydrocarbon exploration)		diameter 1.5 mm line weight .25 mm	On general-purpose maps, show in black. On energy or other special-purpose maps, may show water wells in cyan, oil wells in green, and gas wells in red.
19.5.8	Drill hole—Showing operator number and total depth (in feet)	SHELL 1-55 1800	H-8 → SHELL 1-55 HI-7 → 1800 diameter 1.5 mm line weight .15 mm	
19.5.9	Drill hole—No geologic data	ND	ND ← H-8 diameter 1.5 mm line weight .15 mm	
19.5.10	Trace of inclined drill hole		all line weights .15 mm dash 1.5 mm; space .5 mm 1.25 mm circle diameter 1.5 mm	
19.5.11	Trace of inclined drill hole—Showing inclination	70°	HI-6 → 70° all line weights .15 mm dash 1.5 mm; space .5 mm 1.25 mm circle diameter 1.5 mm	
19.5.12	Trace of inclined drill hole—Showing collar altitude (72 m) and total depth (620 m)	72m 620m	HI-6 → 72m 620m all line weights .15 mm dash 1.5 mm; space .5 mm 1.25 mm circle diameter 1.5 mm	
19.5.13	Dry hole—Unsuccessful hole drilled during hydrocarbon exploration		diameter 1.5 mm .625 mm all line weights .15 mm	
19.5.14	Dry hole converted to water well		1.75 mm 45° 25° all line weights .15 mm .875 mm	
19.5.15	Dry hole converted to injection well		diameter 1.5 mm line weight .15 mm	
19.5.16	Show of oil		diameter 1.5 mm line weight .15 mm	
19.5.17	Oil well		diameter 1.5 mm	
19.5.18	Shut-in oil well		diameter 1.5 mm all line weights .15 mm 1.375 mm	
19.5.19	Abandoned oil well		45° all line weights .15 mm 1.375 mm	
19.5.20	Abandoned oil well—Converted to water well		1.75 mm 25° all line weights .15 mm .875 mm	
19.5.21	Abandoned oil well—Converted to injection well		diameter 1.5 mm line weight .15 mm	
19.5.22	Capped oil well		.875 mm all line weights .15 mm .75 mm	

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
19.5—Oil and gas fields; wells drilled for hydrocarbon exploration and exploitation (continued)				
19.5.23	Show of gas		all lineweights .15 mm diameter 1.5 mm → ← .625 mm	On general-purpose maps, show in black. On energy or other special-purpose maps, may show water wells in cyan, oil wells in green, and gas wells in red.
19.5.24	Gas well			
19.5.25	Shut-in gas well		all lineweights .15 mm 1.375 mm → ←	
19.5.26	Abandoned gas well			
19.5.27	Abandoned gas well—Converted to water well		1.75 mm → ← all lineweights .15 mm → ← .875 mm	
19.5.28	Abandoned gas well—Converted to injection well			
19.5.29	Capped gas well		.875 mm → ← → ← .75 mm	
19.5.30	Show of oil and gas		all lineweights .15 mm .625 mm → ← diameter 1.5 mm	
19.5.31	Oil and gas well			
19.5.32	Shut-in oil and gas well		all lineweights .15 mm 1.375 mm → ←	
19.5.33	Abandoned oil and gas well			
19.5.34	Abandoned oil and gas well—Converted to water well		1.75 mm → ← all lineweights .15 mm → ← .875 mm	
19.5.35	Abandoned oil and gas well—Converted to injection well			
19.5.36	Capped oil and gas well		.875 mm → ← → ← .75 mm	
19.5.37	Abandoned well—Converted to water well		1.75 mm → ← all lineweights .15 mm → ← .875 mm	
19.5.38	Abandoned well—Converted to injection well			
19.5.39	Salt-water disposal well		all lineweights .15 mm 2.75 mm → ← circle diameter 1.25 mm	
19.5.40	Water-injection well		lineweight .15 mm circle diameter 1.5 mm dot diameter .375 mm	
19.5.41	Water-input well		circle diameter 1.5 mm 90° → ← all lineweights .15 mm	